

3.0 Dioxin/Furan Workgroup

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Progress Toward Challenge Goals

United States Challenge: “Seek by 2006, a 75 percent reduction in total releases of dioxins and furans (2,3,7,8-TCDD toxicity equivalents) from sources resulting from human activity. This challenge will apply to the aggregate of releases to the air nationwide and of releases to the water within the Great Lakes Basin. Seek by 2006, reductions in releases, that are within, or have the potential to enter the Great Lakes Basin, of HCB and B(a)P from sources resulting from human activity.”

Canadian Challenge: “Seek by 2000, a 90 percent reduction in releases of dioxins, furans, HCB, and B(a)P, from sources resulting from human activity in the Great Lakes Basin, consistent with the 1994 COA. Actions will focus on the 2,3,7,8 substitute congeners of dioxins and furans in a manner consistent with the TSMP.”

Canada has made significant progress toward meeting the goal of a 90 percent reduction in releases of dioxins and furans, achieving a 79 percent reduction, relative to the 1988 Canadian baseline. Much of the reductions achieved are attributable to the pulp and paper sector after federal regulations were imposed. Figure 3-1 illustrates reductions in the top Canadian (Ontario Region) dioxin/furan emission sources from 1990 to 1997 and 1999 (based on “*Inventory of Releases - Updated Edition*”, February 2001, Environment Canada). Canada will continue to seek reductions of dioxins and furans from anthropogenic sources to meet targets and to work toward the goal of

virtual elimination.

A new Canada-Ontario Agreement with Respect to the Great Lakes Basin Ecosystem has recently been negotiated. The Agreement commits to a 90% reduction in the release of dioxins and furans by the year 2005, from a baseline of 1988.

In 1995, the U.S. achieved a 77 percent reduction in dioxin emissions based on its 1987 draft dioxin emission inventory. The U.S. is expected to achieve a 92 percent reduction by 2004. This significant reduction is expected, mainly from implementation of federal and state regulations requiring the use of MACT (Maximum Available Control Technology) Standards. Figure 3-2 illustrates progress in reducing dioxin emissions in the U.S., by sector, from a 1987 baseline.

Workgroup Activities and the 4-Step Process

In the past year, the workgroup has made the following progress in the 4-step process:

- The workgroup met on November 14, 2001 at the GLBTS Stakeholders Forum in Chicago.
- On May 17, 2001, the workgroup met at the GLBTS Stakeholders Forum in Toronto. The workgroup meeting was held jointly with the HCB/B(a)P Workgroup due to common issues that are of interest to both workgroups.
- The Burn Barrel Subgroup was formed in the Spring of 2000 to address the emerging issue of residential barrel burning. Through several conference calls, surveys and research conducted in the past year, the subgroup has developed a strategy to seek reductions in backyard trash burning, and is currently implementing this strategy.
- During 2000, workgroup members and sector experts developed and implemented a decision tree process to assess major dioxin/furan source sectors and assigned them a GLBTS priority level for workgroup focus. The workgroup analysis



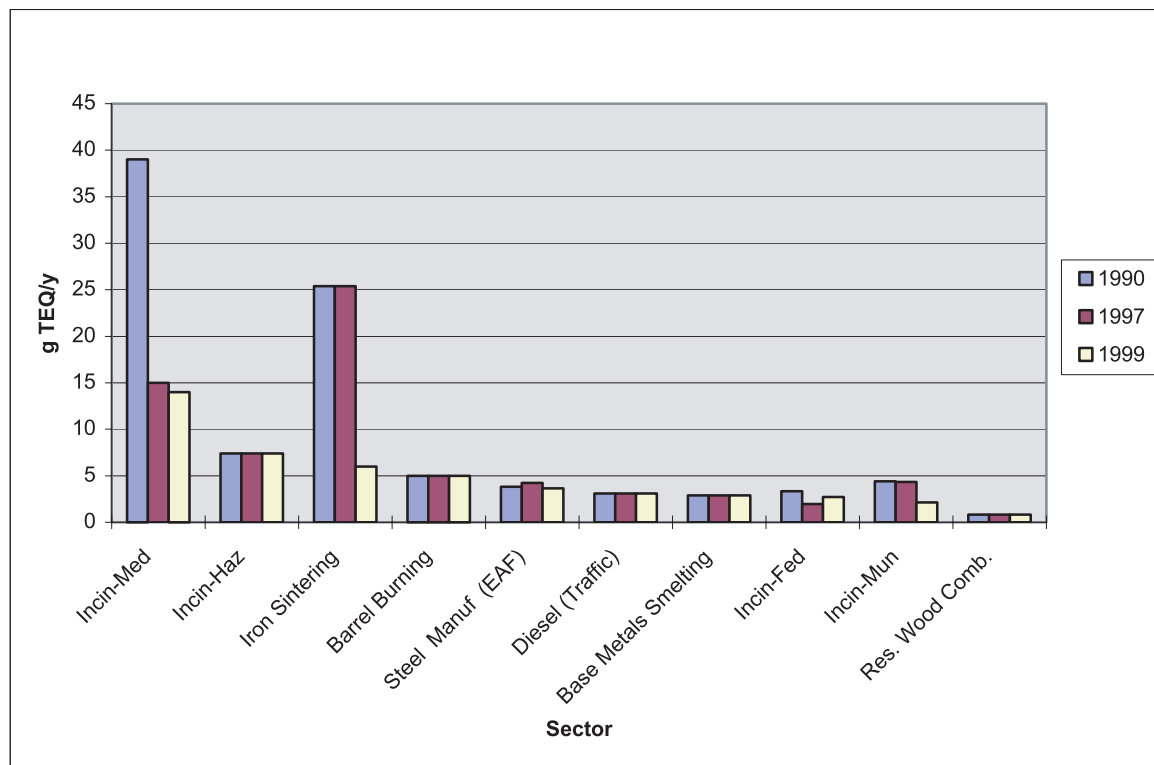


Figure 3-1. Top Canadian (Ontario Region) Dioxin/Furan Emission Sources "Inventory of Releases - Updated Edition", February 2001, Environment Canada

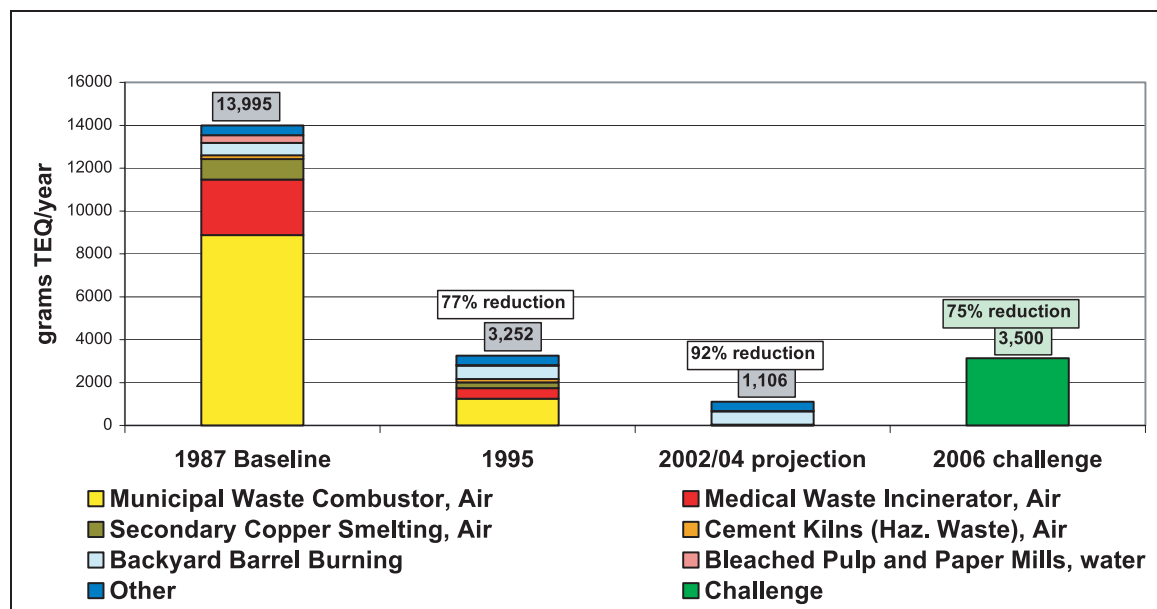


Figure 3-2. U.S. Dioxin Emissions: Achieving 75% Reduction



**TABLE 3-1. DECISION TREE ANALYSIS OUTCOMES FOR SOURCES * OF
DIOXINS/FURANS IN THE GREAT LAKES BASIN**

Prepared for the GLBTS Dioxin / Furan Workgroup

December, 2001

Overview of Sector Prioritization: Status in the Decision Tree Process	
Source / Sector	Priority Designation
Municipal Waste Combustion (MWC)	Low Priority
Medical Waste Incineration (MWI)	Low (US) / Medium (Canada) Priority
Backyard trash / open burning	High Priority
Residential wood combustion	Medium (testing), Low (reduction)
Pentachlorophenols (treated wood)	Low (data gathering) / Priority Ranking on Hold (management)
Cement kilns (hazardous waste burning)	Low Priority
Iron sintering	Low Priority
Steel Manufacturing (EAF)	No priority designation - testing data needed
Secondary copper smelting	Low Priority (US) / No ranking (Canada) due to lack of data
Hazardous waste incinerators	Low Priority
Wood waste combustion	Low Priority
Industrial / Utility coal combustion	Low Priority
Diesel fuel combustion	Low Priority
Landfill fires	No priority designation - information needed
Forest fires	Low Priority

* Sources listed include those that are greater than 2% of either the 1998 Draft U.S. or 1999 Ontario Emissions Inventories. These inventories represent the best information available at the time of workgroup discussions. Values presented in these inventories are currently under review and will potentially change in the final versions.



was focused on dioxin reduction opportunities that went beyond programs or efforts that were already in place and expected to continue. Since the initial priority designations, the priorities of the residential wood combustion and pentachlorophenol-treated wood sectors have changed as new information became available. The current priority sectors are designated as listed in Table 3-1.

- While the workgroup will focus its efforts on sectors with high and medium priority designations, it will continue to monitor progress and gather information for other sectors listed in Table 3-1. As new information becomes available, the table will be revised accordingly, in consultation with the workgroup.

Reduction Activities Canada

Residential Wood Stoves: A joint industry-government project was carried out to characterize releases of toxic pollutants, including dioxins and furans (D/F), their relationship to particulate matter from a conventional wood stove (CS), and an advanced technology system (ATS) USEPA-certified wood stove. The key findings of the test were:

1. Confirmation that ATS significantly reduces a number of pollutants (PM, VOCs, PAHs) compared to conventional wood stoves.
2. Average emission factor for D/F from residential wood combustion is 0.5 ng I-TEQ/kg wood burned (down from previous estimates of 2).
3. Under the testing conditions, it was observed that:
 - a) D/F releases are higher when maple is burned than when spruce is burned, and
 - b) D/F releases are higher with ATS than with CS.

The report of findings, entitled “*Characterization of Organic Compounds from Selected Wood Stoves and Fuels*,” can be obtained from the Environment Canada Green Lane website: http://www2.ec.gc.ca/dioxin/english/res_wood.cfm. Additional research

will be undertaken to better understand the formation of D/F in residential wood stoves.

As a result of the above study, the workgroup changed the priority of this sector at the November 14, 2001 meeting. The need for testing was given a medium priority, but the reduction opportunity was designated low priority, given the leadership of other workgroups (B(a)P) on this issue.

Between February and April 2001, a residential wood stove education and changeout program was led by the Hearth Products Association of Canada, in partnership with Ontario Lung Association and various government agencies, to provide information on cleaner wood-burning methods and changeout incentives being offered through retailers in the Georgian Bay area of Ontario. The changeout program resulted in a replacement of 85 old wood stoves with advanced technology stoves and the participation of over 1,200 people in 12 workshops to increase awareness of cleaner, safer burning practices.

Iron Sintering: *The Iron Sintering Plants Canada Wide Standards (ISCWS) for Dioxins and Furans* were accepted in principle by the Canadian Council of Ministers of the Environment (CCME) in September 2001. Source standards for dioxins and furans are set in three phases as follows:

- Phase 1:** 1350 picograms per cubic meter (I-TEQ) by 2002
- Phase 2:** 500 picograms per cubic meter (I-TEQ) by 2005
- Phase 3:** 200 picograms per cubic meter (I-TEQ) by 2010

In Canada, there is one remaining iron sintering plant: Stelco Inc. located in Hamilton, Ontario. Based on 1998 emission tests (6 grams TEQ/year), the ISCWS will result in reductions in stack emissions of dioxins and furans of 50% by 2002, 80% by 2005, and 90% by 2010. The ISCWS also requires annual testing of emissions and the development of a pollution prevention strategy by December 31, 2002. Retrofits of the pollution control equipment at the Stelco iron sintering plant were made in an effort to meet the above standards. Stack tests were conducted in May 2001 to verify the effectiveness of the retrofits.



Electric Arc Furnaces: *The Electric Arc Furnace Canada Wide Standards (EAF CWS) for Dioxins and Furans* have been proposed as follows:

New and modified plants: 100 picograms per cubic meter (I-TEQ).

Existing plants: 150 picograms per cubic meter (I-TEQ) by 2006; 100 picograms per cubic meter (I-TEQ) by 2010.

Based on currently available information, the implementation of these standards will result in a 60 percent reduction of dioxins and furans emissions by 2010. The EAF CWS also requires annual testing of emissions and the development of a pollution prevention strategy by December 31, 2002. Stack tests have been conducted at three electric arc furnaces in Ontario with results ranging from 51 to 153 picograms per cubic meter I-TEQ. The remaining three electric arc furnaces in Ontario are expected to conduct stack tests by 2002.

Waste Incineration: Canada Wide Standards for dioxins and furans have been endorsed by CCME for the waste incineration sector (municipal, medical, sewage sludge, hazardous waste) and the burning of salt-laden wood in coastal pulp and paper boilers. Provinces are then required to prepare and implement a plan (Joint Initial Actions) to meet the numerical targets. Updated information on the Canada Wide Standards can be found on the following web site: www.ccme.ca.

The Ontario Ministry of Environment announced in December 2001 to phase-out hospital incinerators by amending the existing air pollution Regulation 347. This will divert biomedical wastes to facilities that use state-of-the-art treatment technologies. At the same time, the guideline for biomedical waste incineration was revised to control contaminant emissions by establishing emission limits for particulate matter, dioxins and furans, heavy metals, sulfur dioxide, nitrogen oxides and hydrogen chloride. All existing hospital incinerators will be required to cease operation within one year of the regulation taking effect.

Voluntary Stack Tests: Since the initiation of the Voluntary Stack Testing Program in Spring 2000, Environment Canada has conducted stack tests for dioxins and furans and many other substances of

concern at three facilities in Ontario. Stack tests were conducted at Falconbridge - Kidd Creek, a nickel base metal smelter; at the medical incinerator of Toronto Hospital for Sick Children; and, at Westcast Industries, a steel foundry. Results are currently under review with these facilities. Under the Canada Wide Process, the steel and base metal smelter sectors are in the process of conducting stack tests which will include dioxins and furans. These results will be presented at future meetings.

Ambient Air Monitoring: Ambient air monitoring of the GLBTS substances have been conducted since 1996 through the National Air Pollution Surveillance Network (NAPS). Dioxins and furans have been monitored at seven stations, consisting of four urban and three rural sites. Results have shown elevated levels at urban sites compared to rural sites with mean concentrations ranging from 741 to 2096 femtograms per cubic meter (TEQ) at urban sites, and from 182 to 442 femtograms per cubic meter (TEQ) at rural sites (1996 to 1999). These concentrations remain below the Ontario Ministry of the Environment's ambient air quality criteria of 5 picograms (5,000 fg) per cubic meter (TEQ), 24-hour average.

United States and Canada

Burn Barrel Subgroup: As an emerging issue of dioxins and furans, a Burn Barrel subgroup was formed in Spring 2000 to address the burn barrel issue within the Great Lakes Basin. The Burn Barrel subgroup is currently being led by Bruce Gillies of Environment Canada. A survey of Ontario residents was completed in Spring 2001, identifying that 24 percent of the rural population burned their garbage. In keeping with the strategy developed by the Burn Barrel subgroup, the first activities will involve providing information to local community decision makers, and assisting them with identifying local alternatives to burning. In conjunction with the Lake Superior Lakewide Management Plan (LaMP), initial activities will focus on the Lake Superior Region. Addressing challenges in this region is expected to assist in outreach to other areas of the province. Gaps in infrastructure will also be identified over the winter of 2001. These activities are expected to lead to a broad public outreach program on both sides of the Canada/U.S. border in



the summer of 2002, involving common messages in media, brochures, and workshops. The Development Committee for the Canada Wide Standards on Dioxins and Furans is also looking to the burn barrel activities in Ontario as a potential model for other parts of the country.

Wood Preservers (Pentachlorophenol): In Canada, this sector is currently being addressed by the Strategic Options Process under the Canadian Environmental Protection Act (CEPA). There are no PCP manufacturers in Canada. A Best Management Practice has been developed and is being applied at industrial users and wood-treating facilities. A national strategy is being developed to manage industrial and consumer-based treated-wood waste. Disposal of treated-wood waste is estimated to be a significant source of dioxins and furans release (35.8 grams TEQ per year) if not managed in an appropriate manner. The workgroup will monitor progress on this issue.

Based on the lack of information on the ultimate disposal fate of PCP-treated utility poles that was identified by the workgroup in 2000 through the decision tree process, the Dioxin Workgroup concluded that PCP-treated poles in the U.S. would be designated as a medium priority. The Utilities Solid Waste Activities Group (USWAG) responded to this data need by: 1) conducting a comprehensive survey of electric utility management practices for treated wood poles removed from service; 2) sponsoring an Electric Power Research Institute (EPRI) report on current treated wood pole disposal and recycling options; and 3) developing a Treated Wood Guidelines document that will ensure the continued commitment of the electric utility industry to the sound use and management of treated wood. The Dioxin Workgroup leaders have expressed appreciation for the significant efforts on the part of USWAG. The overall PCP effort reflects a significant success in the GLBTS workgroup process.

As a result of the USWAG survey and Dioxin Workgroup stakeholder efforts, the U.S. information need regarding the disposal of used PCP-treated poles has been reduced from medium to low priority. The Treated Wood Guidelines document resulted in an increased level of awareness by the electric

utility industry of USEPA concerns associated with treated wood. The issue of assigning a priority ranking for additional efforts related to pole management practices has been deferred while the U.S. and Canadian management plans are reviewed and discussed.

Landfill Fires: Preliminary estimations conducted by USEPA showed that landfill fires are a potential source of significant dioxins and furans release. A discussion paper has been prepared by the workgroup co-chairs to present the current situation and the requirements to prevent landfill fires in the Great Lakes Basin. Preliminary investigation has shown that landfill fires appear infrequent, but additional information is required to fully characterize the significance of this source. In Ontario, landfill fires at municipal landfills are infrequent due to existing regulations that ban burning of garbage at landfill sites. It is suspected that landfill fires exist on First Nation lands, but more information on their waste management practices needs to be collected.

Incinerator Ash Disposal: Concerns have been raised about the generation of ash from waste incineration as a potential source of dioxins and furans release. A discussion paper was prepared by the workgroup co-chairs through the collection of information on how incinerator ash is being managed in the Great Lakes region. In Ontario, bottom ash is normally disposed of at a municipal landfill site, while fly ash is managed as a hazardous waste due to its high metal content. There is currently a lack of data on dioxins and furans in bottom and fly ash generated at waste incinerators. Recent amendments made to the Ontario Waste Management Regulation (Regulation 558) set more stringent requirements for hazardous waste management which are expected to result in more wastes being characterized as hazardous.

Ash from municipal waste incinerators in most of the Great Lakes States (Indiana, Minnesota, Michigan, and Wisconsin) is disposed of in a monocell with liners and leachate collection systems. Ash from municipal waste incinerators in New York, Ohio, and Pennsylvania are disposed of in approved solid waste landfills. Municipal solid waste incinerator ash in the U.S. has consistently tested as non-



hazardous according to current testing protocols. However, ash is not tested for dioxin/furans in most of the Great Lakes states, except Minnesota. Further information is needed regarding dioxins and furans in both bottom and fly ash generated at waste incinerators.

Next Steps

Backyard trash burning is an emerging issue and, as more information is gathered and release reductions from other sectors are achieved, is expected to emerge as the largest source of dioxins and furans. As such, the workgroup will focus its efforts on the implementation of the strategy developed by the Burn Barrel subgroup. Both countries are looking to the burn barrel activities in the Great Lakes Basin, especially Lake Superior, as a potential model for other parts of the countries. For other sectors listed in Table 3-1, the subworkgroup will continue to monitor and update the subworkgroup on progress made. Most of these sectors are being addressed

through existing national or regional programs.

To fill information gaps identified in pollutant inventories for dioxins and furans, the workgroup will engage sectors to participate in studies to collect or develop release information. In Ontario, these sectors include pulp and paper (wood waste combustion boilers, Kraft liquor boilers), foundries, petroleum refineries, secondary aluminum smelting, secondary copper smelting, steel sector (cokemaking, blast furnace, steelmaking), and land application of sludge. Both countries have recently added dioxins and furans to their mandatory release reporting programs (Toxics Release Inventory in the U.S. and National Pollutant Release Inventory in Canada). This may provide additional information to help improve the release profiles for dioxins and furans.



Keweenaw Peninsula Michigan

Photograph by Carol Y. Swinehart, Michigan Sea Grant Extension

